

**Markets or Contracts? Uncovering institutional arrangements governing
biodiversity compensation in France**

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Abstract

Biodiversity compensation is often viewed as one well defined approach or instrument (an ideal-type) based on market dynamics: biodiversity offsets would be tradable permits between those responsible for degrading biodiversity and those having restored or maintained biodiversity components elsewhere. Yet, as in the case of other market-based instruments (MBIs), we argue that this view is challenged by practice. We thus call for a clarification of the economic characteristics of the family of policy instruments gathered under the term compensation. Applying a typology of MBIs and building on new institutional economics, we show that so-called compensation initiatives could be better characterized either as market governance or bilateral governance structures, depending on cases. We support our view with the empirical case of the emergence of compensation in France. This case illustrates the necessity to make clear that the term compensation includes contrasting instruments from the market-based instruments' point of view, and that their implications and related expectations differ. It also shows that moving biodiversity compensation mechanisms from bilateral governance to market governance, for instance in France, will be challenging.

Keywords: biodiversity compensation, tradable permits, bilateral governance, market governance, France, market-based instruments

JEL Codes: Q58, Q57, Q24, Q50

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1. Introduction

Market-based instruments (MBIs) have become the center of attention in the field of ecosystem services provision (Ecosystem Marketplace 2009; OECD 2010), along with the burgeoning of economic valuations purportedly supporting the implementation of these instruments and better policy-making (Sukhdev 2009). Yet, we argue, confusion remains regarding the economic characteristics of these policy instruments, which in reality tend to exhibit a vast range of approaches (Pirard 2012). The very notion of markets, and the role these markets play in the various existing and envisioned MBIs, appears to be extremely diverse. Although MBIs are all supposed to share as common characteristic the internalization of costs and benefits that a given activity or product generates, and to give way to monetary transactions, this in itself gives few indications about their specificities and ways of implementation in practice. For instance paying a price premium for eco-labeled products, buying biodiversity offsets to get the right to continue business-as-usual, or distributing subsidies to farmers, all hardly compare in terms of legal provisions, stakeholders involved, or expected impacts on producers' decisions.

One of these MBIs, biodiversity compensation is an approach that has gained a lot of visibility in both developed (Doswald *et al* 2012, Conway *et al* 2013) and developing countries (BBOP 2012). In turn, the integration of this approach in public policies and business strategies has triggered many highly conflicting debates of which we can provide several examples. While Merrifield (1996) and Wissel and Wätzold (2010)

acknowledge the capacity of tradable permits in habitat to efficiently reconcile economic development with environmental conservation, and Robertson (2009) argues that wetland banking may enhance environmental effectiveness if certain conditions are met, Robertson and Hayden (2008) show on the contrary that entrepreneurial wetland banking may also produce quantifiable temporal loss of wetland ecological functions. Institutionally, although Robertson (2009) foresees an expansion of wetland banks owing to skillful bankers guided by market incentives and initiatives taken by regulators, Walker et al. (2009), Bekessy et al. (2010) and BenDor and Doyle (2010) rather doubt that regulatory conditions and safeguards currently exist at a sufficient degree for no net loss to make progress with emerging markets for biodiversity offsets. From an ethical point of view, Pawliczek and Sullivan (2011) and Sullivan (2013) criticize the commodification, neoliberal and 'green economy' discourses that support mitigation banking, as they point to their assumed negative effects on distribution and equity.

As reflected in most studies addressing biodiversity compensation, the overall principle is to compensate biodiversity losses caused by a project on a given site with the creation, rehabilitation, restoration or conservation of biodiversity on another site. Yet, little is said about practical means of implementation on the ground and the overall principle can be interpreted in many different ways. Are the agents responsible for degradation supposed to engage themselves in restoration? Should they pay a fine that will be used later on for funding restoration? Do they have to buy biodiversity restoration units from another company that previously engaged into restoration activities? Based on which contracts and regulations are these restoration activities undertaken? Reversely, a similar observation applies to MBIs in general

and biodiversity compensation in particular: an instrument or category of instruments takes different names but substantial differences are not obvious. In the end, from “compensation” to “biodiversity offsets”, from “mitigation banks” to “species banking”, few can find their way; and the references from the literature mentioned above address differing or even not comparable instruments.

In this context and from both an academic and a policy perspective, we contend that confusion around the terms and what they encompass needs to be tackled in order to have more fruitful and constructive debates about the future of policy instruments for environmental purposes, including biodiversity compensation. Confusion is indeed detrimental to a mutual understanding among analysts and thus to consensual conclusions on the merits and shortcomings of specific policy instruments; they trigger and fuel controversies that prove counterproductive. Proponents and critics of these emerging schemes might altogether miss the point in their arguments, and policy making suffers from false conceptions circulating and influencing social perceptions about the risks (e.g. commodification of nature and greenwashing) and opportunities (e.g. increased efficiency and new sources of funding) of biodiversity compensation.

Consequently, this article is an attempt to identify the conceptual and practical differences and similarities, as well as the respective states of development, for various biodiversity compensation designs. To do so, it combines a theoretical economic analysis of MBIs building on neo-institutional framework and an empirical study of the legal framework regulating biodiversity compensation in France. Both inputs will help to clarify where we stand in this country: is biodiversity compensation an attempt to promote market-based instruments, such as tradable permits, how is it

done, can it be achieved and on what conditions? Having such a combination of legal and economic analyses allows us to provide new insights to previous studies of the French legal framework (Quétier et al. 2013). We follow a positive rather than a normative approach and thus this article does not intend to assess whether biodiversity compensation has the potential to reduce effectively the erosion of biodiversity. Instead, it aims at clarifying the debate for sounder and relevant policy decisions to be taken in the future.

Next section will present our analytical framework designed to better study market instruments for biodiversity: a typology of MBIs and the distinction between broad governance characteristics. Thereafter, various forms of biodiversity compensation in France will be described along with associated legal provisions. The following section will then theoretically characterize and discuss these different schemes in light of our categories of instruments and their mode of governance (market or bilateral). Finally the conclusion will discuss the prospects, and related conditions, for a higher degree of marketization of biodiversity compensation in France.

2. Theoretical framework: a diversity of market-oriented approaches for biodiversity conservation

2.1 A typology of market-based instruments for biodiversity

It is not clear whether and how the terms ‘economic instruments’, ‘market-based mechanisms’, ‘incentive-based instruments’, ‘environmental markets’ and others overlap substantially. But we believe that for the sake of clarity and usefulness,

markets should be referred to for specific reasons rather than being just a substitute term for 'monetary' or 'economic'. Yet this is rarely verified in practice.

The only common characteristic for all MBIs seems to be the fact that nature is 'priced' to different degrees and in different ways. This does not mean that economic valuations are applied to the environment in order to set a price (Laurans et al. 2013), or that environmental commodities are exchanged. It simply means that monetary values are associated with nature, whether for market exchange or for direct deals between a limited number of stakeholders, or for whatever other purpose.

Such a diversity of MBIs calls for the design of a compass to navigate among objects that significantly differ. Our compass in this article is a typology of the various market instruments and it will allow us to make important distinctions. Knowledge about strengths and weaknesses of each policy instrument, their scope of application and other important characteristics can be improved, in our opinion, once the analysis is applied to homogeneous groups of instruments. The typology used in this article (Table 1) thus aims to distinguish between the various instruments on the basis of their intrinsic economic characteristics, the nature of their relations to markets, and the nature of the market that is considered with the instrument (alternatively classified as competitive market, transaction, exchange, payment, etc.). The typology is an important input for this article because it will help us to theoretically characterize biodiversity compensation, which is assumed to be a MBI, from the perspective of market dynamics. A comprehensive description and discussion of the categories is available in Pirard (2012), and we will only provide an overview here.

Two categories refer to instruments that lead to a change in the price of a product (or its production costs) in order to account for positive or negative externalities that are generated during the production process. These two categories – ‘regulatory price changes’ and ‘voluntary price signals’ – differ substantially in the way they operate. These price signals can be sent through either mandatory or voluntary measures, with important consequences for their links with public policies and regulations. These types of instruments rely on existing markets and, in the case of voluntary price signals, require the existence of both a product that is clearly associated with these positive externalities and a biodiversity component (or ecosystem service) that is easy to communicate to a wide consumer audience. Their range of applications is certainly the widest of all categories, and has the longest history in the case of fiscal policies.

The economist Ronald Coase (1960) has advocated an approach to environmental externalities that is totally different from regulations using price signals, and this underpins the ‘Coasean type agreements’ category. According to the Coase theorem, economic agents can more or less spontaneously make bilateral deals and exchange rights in order to improve their mutual welfare if transaction costs remain low. In practice, this approach relies on property and use rights applicable to natural resources as negotiations between agents might lead to a suspension or modification of their use in order to provide ecosystem services. As such, it also prolongs the theory of property rights that applies perfectly to environmental externalities (Demsetz 1967; Alchian and Demsetz 1973).

Table 1. A selected typology of market-based instruments for ecosystem services

Category	Exclusive characteristics	Specificities	Relation to markets
Direct markets	A market where an environmental product can be directly traded between producers and consumers (or processors)	Can be framed at the international level with specific rules for each country and a great variety of deals (genetic resources), or as a more classical market with more or less processed products (NTFP)	Proximity to the market definition depends on cases and the degree of commodification
Tradable permits	An <i>ad-hoc</i> market where users of an environmental resource need to purchase “permits” that can be further exchanged among resource users, thereby creating artificial scarcity	Designed to either serve a clear environmental objective (with bio-physical indicators) or based on acceptable social costs (market price for carbon)	Creation of a specific market for a given environmental objective, information are expected to be revealed
Coasean-type agreements	Ideally spontaneous transactions (free of public intervention) for an exchange of rights in response to a common interest of the beneficiary and the provider	Requires clear allocation of property rights, highly site-specific and difficult to replicate on a large-scale	Usually not following market rules, more of a contractual nature
Regulatory price changes	Consists in regulatory measures that lead to higher or lower relative prices	Part of a fiscal policy (including subsidies) with environmental objectives and complete control by public authorities	Based on an existing market
Voluntary price signals	Consists in schemes whereby producers send a signal to consumers that environmental impacts are positive (in relative terms) and consequently gain a premium on the market price	Still limited as an incentive for action due to relatively low willingness to pay by consumers	Uses existing markets to identify and promote virtuous activities

Source: Adapted from Pirard (2012)

The rationale of the category ‘tradable markets’ is to create a new market for a particular environmental problem in order to efficiently and sustainably manage a scarce resource, such as fish stocks. The scarcity is somehow artificially created, as in the case of greenhouse gases in order to limit emissions once commitments are negotiated. The market is then supposed to lead to more cost-efficient outcomes for

a given environmental objective – which is agreed upon at the outset – and all stakeholders are free to exchange allowances (or permits, quotas, credits, certificates, etc.) depending on their costs, benefits, reactivity, or any factor that may impact their decision process.

A last category is named 'direct markets' and includes all markets that are created in view of exchanging environmental products alone. Yet a 'direct market' can take on as many forms as there are environmental products, and it may be challenging to put genetic resources and non-timber forest products, for example, on the same level. Certainly, the respective abilities of these diverse markets to ensure long-term conservation and provision of ecosystem services might be very different.

2.2 Further useful theoretical discrimination: market governance versus bilateral governance

While the typology with its categories is intended to improve analysts' understanding of the diversity, feasibility of implementation, constraints and limits of MBIs, in real-life policy instruments admittedly operate at different levels (e.g. incentives provided to agents on the ground with national policies, or to countries with international mechanisms) and commonly exhibit multidimensionality. Indeed, several MBIs are commonly combined in order to serve a given policy objective (Pirard and Lapeyre forthcoming) and as a result any given instrument, including biodiversity compensation, may be classified in different categories. For instance, the REDD+ mechanism for reducing tropical deforestation could be viewed as the combination of (i) a cap-and-trade system at the international level if connected to carbon markets,

(ii) the implementation of fiscal measures nationally for land use planning, and (iii) payments for ecosystem services to land owners at the local level for conservation and sustainable management.

Importantly, each of these layers for one given policy instrument may have its own rationale and justification. First, these instruments may be praised for their alleged capacity to incentivize stakeholders as opposed to coercion. Through subsidies or other sorts of payments, economic agents are influenced to make decisions in favor of biodiversity or economic services. This applies to producers who might modify their agricultural practices in order to receive money with agro-environmental schemes, but also to consumers who might buy certified products at a higher price to reveal their preferences. The incentivizing potential is actually verified for all categories of MBIs yet in various ways. For instance, the marketization of an environmental product encourages sustainable use to maintain a certain level of profits in the longer term (e.g. argan oil for “direct markets”), and the prospects to sell tradable permits is an incentive to reduce carbon emissions.

Besides, MBIs are supposed to correct market failures (usually by internalizing externalities, i.e. providing an economic value to the positive or negative impacts of a given economic activity) and hence to improve the allocation of efforts and costs. In other words, the objective of their design and implementation is to trigger decisions that move capital and investments into a direction deemed favorable to the conservation of biodiversity and the maintenance of ecosystem services. With biodiversity compensation in mind for instance, it translates into the search, by infrastructure developers, of sites with the lowest impacts on biodiversity; but it also

implies that those in charge of land restoration or protection will target sites with the highest potential in biodiversity terms and the lowest costs.

The relative weighting of these assumed strengths – incentivizing and optimal allocation of efforts – differs for each instrument. This differentiation, we argue, is in turn actually related to a useful distinction made between several specific governance paradigms. Indeed, following neo-institutional analysis by Williamson (1979), two contrasting conceptions of market relations can be opposed in order to disentangle instruments' economic characteristics, and therefore their respective associated strengths and risks. On the one side, market governance is “the classic nonspecific governance structure within which faceless buyers and sellers meet for an instant to exchange standardized goods at equilibrium prices.” (Williamson 1979, p. 247-248); here the medium in the exchange remains the sale rather than the contract and the identity of parties is almost of negligible importance. The rationale is to have as many economic agents as possible involved in the market in order to reach a high degree of competition and an equilibrium price. At the opposite, bilateral governance applies to non-replicable transactions between a limited number of agents with rather specific goods and non-transferable investments in physical and human assets. In this case, the non-standard and ill-defined nature of the good and service concerned makes market governance hazardous, and long-term (or recurrent) transactions justify the costs of additional governance mechanisms in order to tackle complexity (long-term contracts with direct payments and recurrent monitoring).

Importantly, this distinction is complementary to the categories of MBIs previously discussed. It serves to make further difference (not only conceptually but also in practical terms) between on one side well-organized and fluid markets for tradable permits that would be exchanged easily, and on the other side the design of specific bilateral agreements and payments for biodiversity conservation activities, undertaken by companies and landowners, e.g. biodiversity restoration activities. In turn it also usefully helps us to better theoretically characterize one specific assumed MBI, biodiversity compensation, as we will see below.

3. Empirical case study: biodiversity compensation in France

Studying the specific empirical case of biodiversity compensation, a commonly supposed MBI, we now aim at empirically analysing characteristics of such instrument in France. In particular, is there one unique or several types of instruments for compensation in France? Is this (are these) instrument(s) even an MBI? If yes, what type of type of MBI is this (are these), in light with the proposed typology? And under which type governance is this (are these) governed with regards the Williamson's (1979) distinction?

After describing the legal framework regulating development and compensation activities in this part 3, we will analyse it through the length of our typology and neo-institutional distinction in next part 4.

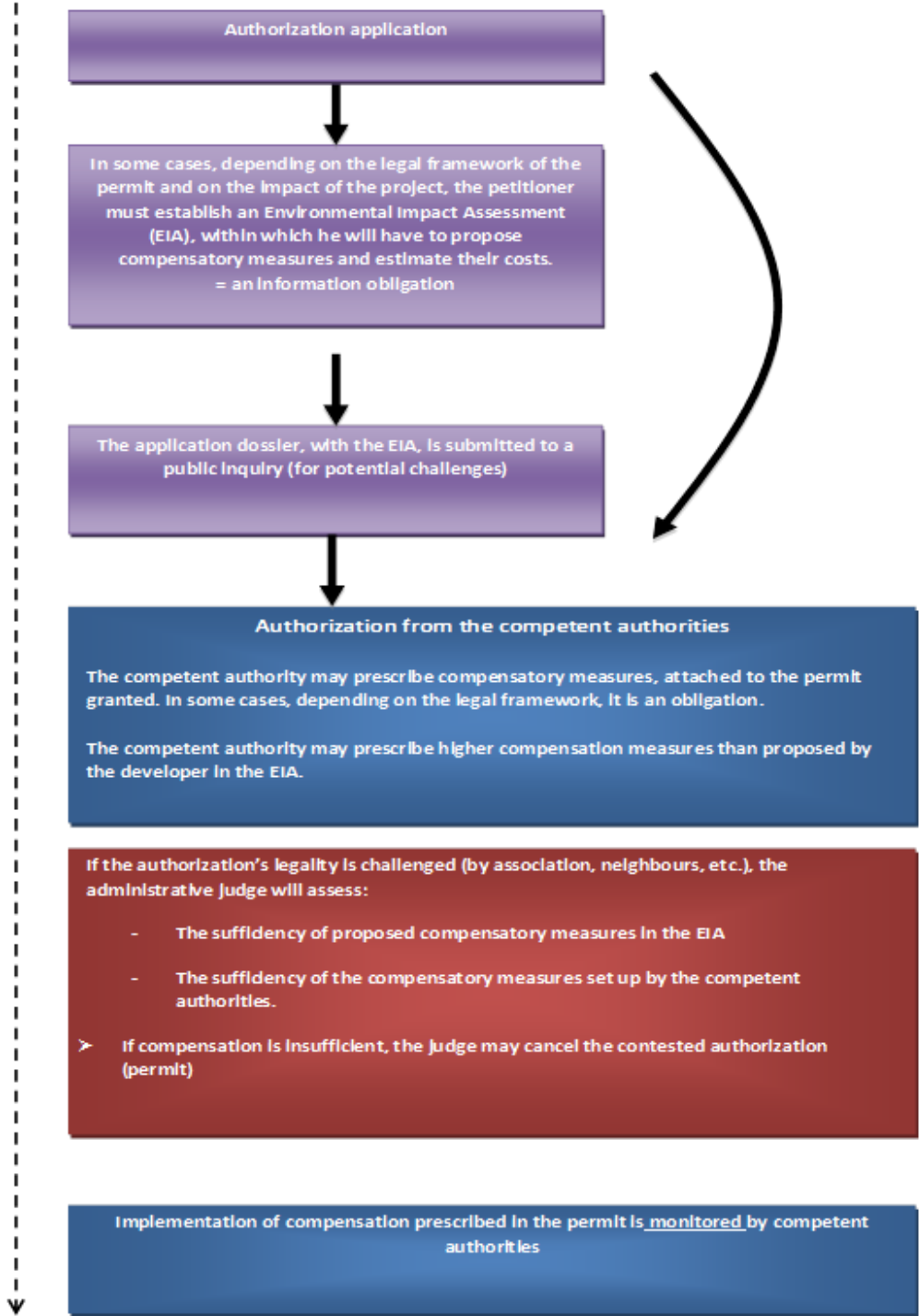
3.1. Legal framework for biodiversity compensation in France: a demand analysis

3.1.1. Distinction between compulsory compensation and voluntary compensation

When developing a project in France, developers, depending on the legal framework to be complied with, either face the legal obligation to offset environmental impacts caused by their project, or may only voluntarily compensate these.

Legally, compulsory compensation refers to compensation implemented by developers in order to fulfil some compulsory obligations as prescribed in administrative permits they need for the implementation of some public or private projects and for the operation of some industrial installations. As described in figure 1, when applying for an authorization (permit) to develop a project, the applicant may have the obligation to make an environmental impact assessment (EIA), in which compensation measures will be proposed. The permit application together with the EIA (if needed), after being presented for public inquiry, is thereafter handed over to the administrative competent authority, who decides either or not to grant the permit. In the latter, the competent authority may prescribe compensation measures attached to the permit. Eventually, if the permit is granted, the latter authorization can be challenged by outside actors (e.g. NGOs); in this case the administrative judge will assess legality of the permit based on the compensation measures attached to it and may cancel it. When the development permit is granted and not legally challenged or cancelled, enforcement of compensatory measures on the ground is finally controlled by the competent authority in charge of issuing the permit.

Figure 1. Summary of the procedure commonly used for the administrative authorization of private and public projects and works in France



Source : Authors

On the contrary, voluntary compensation involves measures implemented on a voluntary basis by operators, regardless of any obligation. Project developers may decide to develop and implement compensatory measures on a voluntary basis for the purposes of improving their reputation or enhancing the corporate social responsibility strategy without any legal obligation. However, in France voluntary compensation remains so far marginal in comparison with the number of compulsory compensation activities implemented on the ground. For this reason, we only address here the case of compulsory compensation.

3.1.2. The compulsory compensation legal framework

In France, a legal framework for biodiversity compensation has been introduced by the 1976 Nature Protection Law. It has considerably been improved in recent years, particularly under the impetus of the so called *Grenelle* Laws I (2009) and II (2010), which have translated in legal terms most of the improvements requested by civil society after a major consultation of stakeholders on sustainable development (*Grenelle de l'environnement* in 2007). In France, as in the European Union (EU), biodiversity compensation is carried out through sustainable restoration measures resulting from activities designed to compensate significant residual negative environmental impacts caused by the development of projects, including the operation of industrial installations, so as to ensure no net loss in biodiversity.

According to the environmental management mitigation hierarchy, partly originating from some EU legislation on nature protection (particularly Directives 92/43/EEC of

21 May 1992, 2001/42/EC of 27 June 2001, and 2011/92/EU of 13 December), compensation can only be envisaged after prevention and mitigation measures have been implemented, in order to offset residual impacts which cannot be avoided or reduced. Consequently, compensation must only be subsidiary and exceptional. Such hierarchy is now part of the Constitutional Charter for environmental protection and is reflected in the various French compensation legal frameworks; it is also detailed in the 'avoid, reduce and compensate doctrine' paper (2012) (*doctrine 'éviter, réduire, compenser'*), also called 'Doctrine ERC', and completed by guidelines (2013).

3.1.2. a. The various compensation legal frameworks

There is no one single legal framework for environmental compensation in France, but rather various legal frameworks guided by different policy objectives (protection of the environment in general, or specifically protection of the Natura 2000 network, protection of water resources or forestry resources, etc.).

The scope of compensation and the margin of discretion left to competent authorities to impose an obligation, attached to the granted development permit, to compensate residual environmental damages (see figure 1) vary according to the pursued policy objectives within each legal framework.

Competent authorities have a margin of discretion to prescribe those compensatory measures as deemed necessary for the achievement of environmental protection goals. When required by the permit, compensation measures become part of the permitting conditions for the development of projects or the operation of installations, which can therefore be controlled and enforced by the competent authority. In case

of non-compliance with such permitting conditions by the project developer or the operator, the competent authority may decide to apply administrative sanctions, or even call for the application of penal sanctions, and decide upon the suspension of the operation.

In order to implement compensation in a coherent and coordinated manner, the French legislator has decided in some cases to more precisely specify conditions in which competent authorities would possibly prescribe compensation measures attached to the permit. For instance, article L. 341-6 of the Forestry Code relating to tree clearing provides for the possibility to require from the project developer to afforest or reforest in proportion up to 1 to 5 times the cleared surface, depending on its ecological and social importance; similarly, article L.143-2 of the Forestry Code provides for the possibility to prescribe compensation for the cutting of coastal dunes' plants.

In other frameworks however, when the primary goal is to protect sensitive environmental objectives, the legislator has increasingly tended to rather legally impose on competent authorities the prescription of compensatory measures. Hence, what was a simple possibility left to the discretion of competent authorities has now become an obligation, and compensation measures tend to become a systematic condition for the approval of large infrastructure projects (railways, motorways, etc.), in particular those where the State is the operator. In the following situations for instance, among others, competent authorities have the obligation (not only the possibility) to prescribe developers to compensate whenever this is possible and necessary:

- If objectives set for the protection of water resources as stated in the *Schéma Directeur d'Aménagement et de Gestion des Eaux, SDAGE* (planning document concerning water management) are negatively affected (Article L.212-1 XI Environment Code);
- If a project or installation has negative impacts on « the coherence of the Natura 2000 » network (Article L.414-4 Environment Code)
- Where a project has negative impacts on protected fauna and flora species and habitats and the project developer must obtain derogation from the prohibition of destruction of such species and habitats (Article L.411-2 Environment Code).

In all these cases, legality of the permit is then scrutinized as regards the compliance of measures taken by the project developer with compensation requirements set by the competent authority.

3.1.2. b. Criteria for compensation according to the “Doctrine ERC”

As pointed out in the governmental doctrine ERC, compensatory measures prescribed and attached to the permit should ensure no net loss of biodiversity, and to this end, three criteria must be applied by competent authorities, when looking at the application, on a case-by-case basis. First, equivalence is at the very heart of the compensation concept. It is assessed on a case-by-case basis. The equivalence between biodiversity damages generated by the project and gains expected from compensatory measures should be ensured on a like-for-like basis to effectively contribute to minimizing development impacts on biodiversity. Preferably, offsets are expected to occur near or adjacent to the impacted site (in-situ offsets), except if

geographical distance doesn't reduce the compensation's effectiveness. Second, additionality ensures that the positive outcomes of measures would not have happened in the absence of environmental management activities carried out for compensation. For instance, they must be additional to existing or planned public policy targets or requirements (e.g. a natural reserve) to be eligible. Third, to ensure durability, the duration of compensation is defined in accordance with the duration of the impacts caused by the project. In order to avoid breaches in ecological continuity, competent authorities must usually require anticipating the compensation implementation. It can therefore be prescribed that the compensation be already implemented before the impacts' occurrence.

Such guidance in criteria to be applied when scrutinizing authorization provides for a more harmonized framework to be used by competent authorities to concretely decide how to compensate the project's negative residual impacts. Criteria should be respected regardless of the legal framework where compensation is required (see above). However, this guidance is not legally binding and not always used in an optimal manner because of the lack of institutional arrangements and capacities to foster its effective implementation on the ground (Quétier et al. 2013). We analyse this below.

3.1.2. c. Requiring compensation in practice

Unfortunately, we contend, compensation is in practice still rarely required by competent authorities or is often prescribed inadequately or insufficiently with regards residual damages caused. On the one hand, the stringency of compensatory

requirement fundamentally depends on the awareness and technical capacity of the designated competent authority at the local level. On the other hand, all petitioners are not treated on equal footing; noteworthy, competent authorities are more stringent with big companies which are more visible (e.g. companies contracted by the State for the construction of large linear infrastructures such as railways and motorways).

Besides, equivalence is inadequately applied, as competent authorities often refers to ratio in term of surface areas instead of imposing an environmental added value corresponding to the residual impacts identified through the EIA. In theory such deficiencies in applying legal requirements for compensation by competent authorities should be identified and eventually sanctioned by the administrative judge (see figure 1); yet for such judicial control to operate, the legality of the permit should be challenged by a person or an NGO having interest to suit the case before an administrative Court. This has so far still been rarely the case.

In total, compensation measures prescribed by the competent authority may vary from one project to another, leading to a quite heterogeneous and unpredictable approach for both project developers and public authorities. Three important factors may explain such heterogeneous situation. First, the competent authority has to apply the specific legal framework which is relevant for the project or the installation, and take into consideration the related policy objectives. Second, the competent authority needs to address residual impacts through very specific compensatory measures in light with the equivalence criterion (the French doctrine ERC requires a strict approach to equivalence in the name of sustainability, see Quétier et al. 2013).

Third, competent authorities have different expectations, practices and capacities from one region to another.

3.2. How is compensation in France implemented on the ground? A supply analysis

Once compensatory measures have been required by the competent authority as a permitting condition, the project developer must implement such measures on the ground.

Legally in France, unlike in the United States, project developers having compensation obligations cannot transfer their liability to third parties through contractual arrangements. Yet, a project developer may choose to carry these obligations out themselves directly or on the contrary transfer this task to a third party.

In the latter case, the developer can entrust service providers, farmers, NGOs, municipalities and districts, etc., to implement rehabilitation actions. Without any transfer of liability, the different possible contracts remain however private legal agreements that are unenforceable against the administration. Of course, this has important implications for institutional arrangements designed to practically implement compensation on the ground, as we shall see below. Here, two approaches currently coexist in France: the so called on-demand approach and the on-supply approach.

3.2.1. The on-demand approach

The on-demand approach is the traditional approach. The developer with compensation obligations (after being granted a permit) contracts service providers, farmers, NGOs, municipalities and districts, etc., for the design of compensation measures or the identification of eligible sites through an inventory of habitats and species (intellectual services), or for the implementation of compensation measures, including physical works and monitoring (material services).

The compensation is tailored ex-post in order to comply with permitting requirements as required by the competent authority in the permit. The contract will define the service to be done and the corresponding payment. The negotiated amount of the payment will depend on the related costs of the services provided.

3.2.2. The on- supply approach

Nowadays, the on-supply approach is actively considered. In this approach, compensatory measures are carried out by a third party independently from a previously identified need for a given project. They are defined on an ex-ante basis in anticipation of impacts that may be generated on certain types of habitats and species.

Such operations enable the production of certificates that prove the completion of compensation measures. Certificates can be sold by third parties, and are materialized by contracts agreed on with buyers. Certificates refer to a surface area on which restoration measures are implemented (usually 1 ha). Their price is fixed for each parcel and reflects costs of buying land, improving habitat and long-term

management. In theory, developers with compensation obligations could buy those certificates in order to prove to the competent permitting authority that required compensatory measures, as attached to the permit, have been implemented.

In France, compensation banking is however still in its infancy. The only operational compensation banking project, the “Cossure Natural Asset Reserves (*Réserve d'Actifs Naturels*)”, was launched in May 2009. Through financing restoration of steppe-bird habitats, it aims at anticipating potential compensation demand in the region. For this, the bank *CDC biodiversité* (the compensation operator), a subsidiary of the French Sovereign Fund, has provided the initial funds so as to acquire 357 ha of private land over 30 years. The bank is restoring the steppe habitats by converting arboriculture land into sustainable grazing areas. It then issues compensation certificates and sells these to project developers with compensation obligations in the region.

Following the CDC experience, the Ministry of environment has called a tender for four similar projects of habitat banking. Operators were invited to create habitat banks under its control. However, the tender did not prove very successful as habitat banks' operators had to bear all financial responsibilities without any guarantee that they would be able to sell the generated offsets (certificates) in the future. Four projects were finally selected to create habitat banks respectively in Bretagne, Alsace, the Alps and the Mediterranean region. Issued certificates will address compensation needs for various ecosystems and species under pressure. Through those banks, different types of certificates will be issued, e.g. units for alpine environment, aquatic environment, semi-covered forest habitats or closed forest

habitats. However, no common methodological standard is yet set for defining the content of the certificates, which would *in fine* allow for their comparison.

At odds with a clear process or marketization, the Ministry of environment has presented this project as a way to assess the potential of habitat banks to cater for offsetting needs for future infrastructure development plans. Officially it was not intended to create a trading scheme in biodiversity units but rather to test the opportunity and feasibility of anticipated compensation by third parties. Importantly also, this new approach is well embedded in the existing regulatory framework. First, as specified above, project developers buying certificates remain liable for the implementation of compensatory measures agreed on through such certificate. Second, compensation certificates are not entirely fungible units, since developers can only use these certificates in the case of strict equivalence with their own very specific compensation obligations. Equivalence will be assessed on a case-by-case basis by the competent administrative authority for the project. In consequence, certificates can only be used to fulfil compensation obligations if the habitat bank, from which it has been bought, provides ecological performances (species, habitats, etc.) very similar to those required in the permit. Consequently, in order to ensure such equivalence between damages to be compensated and ecological measures implemented by the bank, the nature of those measures need to be negotiated between the seller and the buyer. For instance, the habitat bank's site should be near to the impacted site and present similar ecological functionalities.

4. Discussion: how is biodiversity compensation institutionally governed in France?

As mentioned earlier, compensation is mainly applied in France through prescriptive regulations. Nonetheless, at the implementation stage, developers are able to mobilize certain market instruments in order to deal with third party actors and make sure compensation measures are undertaken on the ground. Just how the on-demand approach and the on-supply approach are to be institutionally characterized within our typology and Williamson's (1979) governance distinction is analyzed below.

4.1. Characterizing the on-demand approach: bilateral governance with contractual Coasean arrangements

Within the on-demand approach, compensation measures are implemented ex-post after the competent authority has defined required conditions attached to the permit. As a result this approach is based on ad-hoc transactions between project developers with specific compensation obligations and operators and services' providers in order to fulfil these obligations on behalf of the former. Theoretically, these transactions meet the characteristics of bilateral governance as the contract is tailored for a very specific objective in a very specific place and time. The non-standardized nature (specificity) of this transaction forces the developer and the third party (service provider) to agree on a specific contractual framework and negotiate the payment provided for compensation implementation. *In fine* the contract, better characterized as a Coasean agreement, allows both parties to gain and results in a cost-effective, optimal situation where compensation costs are minimized. As for the

great variety and specificity of compensation needs, there is a wide spectrum of idiosyncratic contracts. Besides, given the durability criteria, long-term availability of appropriate compensation sites is a key component of these contractual arrangements; and the impossibility for developers to transfer their compensation obligations (liability) to third-parties means the former are legally tied to the latter on a recurrent and long contractual relationship.

4.2. Characterizing the on-supply approach: the absence of standardized transferable units undermines the possibility of market governance

Business transactions within the on-supply approach are more difficult to characterize. Indeed, the principle of habitat banking as implemented in France (see above) refers to a system whereby project developers can purchase already existing compensation certificates (where compensation is already implemented by a third party) in order to compensate their own damages in anticipation and hence fulfil their compulsory obligations under conditions stated by competent authorities. Yet can this system be theoretically characterized as a market of tradable permits, regulated under market governance?

When determining if those certificates could widely be exchanged as standard commodities on an open market, one needs to assess their degree of fungibility. At the current experimental stage of habitat banking in France, many arguments, we contend, tend to prove that no fungibility exists between certificates issued by the various pilot projects. First, the considered pilot projects concern very different habitats (Bretagne, Mediterranean, etc.) and species (Alsatian Hamster, Black Grouse), which cannot be considered as substitutable according to the criterion of

equivalence applied in France. Second, the certificates issued by habitat banks in France are not standard commodities (tradable permits) but rather private titles issued under specific conditions and standards which are negotiated and specific to each project. Indeed, there are no harmonized standards and indicators so as to ensure that certificates are comparable. Third, within the same bank, different types of certificates, not comparable, will be proposed depending of the type of habitats considered. In this context, the content of each certificate might be negotiated between the seller and the buyer to precisely meet the latter's needs so that it could fulfil its compensation obligations. Forth, in any case, the use of this certificate for fulfilment of compulsory compensation remains subject to the discretion and appreciation of the authority, which is competent whether or not to accept such certificates as a way to legally ensure the required compensation. Their acceptance may also *in fine* depend on the administrative judge's assessment of the sufficiency of measures prescribed by the competent authority (if the legality of the permit is challenged).

In total, within the French legal framework for biodiversity compensation, fungibility between certificates is very limited. Issued certificates could only be used for very specific compulsory compensation needs. Besides, the original buyer will have to keep its certificate as long as necessary to fulfil his compulsory obligations to compensate residual impacts. Concretely, this means that the developer could only trade its certificates when discharged of its obligations or if these certificates exceed its obligations. Even in the latter case, this remains very risky and uncertain as the developer selling its certificates in excess should find a buyer with legal obligations for very similar compensation measures. As a result, certificates could only be

exchanged between project developers with projects impacting very similar species or habitats in a very limited geographical area and time lag.

Far from displaying faceless buyers (project developers) and sellers (biodiversity banks as third parties) who meet for an instant to exchange standardized compensation certificates at equilibrium prices (tradable permits), the on-supply approach does not feature economic characteristics of market governance, as it could be assumed by some critics. Adding here the impossible transfer of liability from buyers (developers with compensation legal obligations) to sellers (compensation operators), transactions on this hypothetical market actually remain specific and long-term based. As in the case of the on-demand approach, these are theoretically better characterized as Coasean agreements governed under bilateral governance.

4.3. Adding a layer to governance complexity: practical restoration at the local level with payments for ecosystem services

In both on-demand and on-supply approaches, third parties (compensation operators) contracted by project developers with compensation obligations might either buy land and undertake restoration activities themselves, or in turn contract with landowners and farmers to implement these activities on their respective land. In the latter case, third parties might agree on direct payments for environmental services to landowners and farmers, attached to strict and specific conditions to be met overtime, in order to achieve compensation objectives at the local level.

Theoretically, this second layer of governance within the French compensation framework also features characteristics of Coasean agreements governed under bilateral governance (Lapeyre and Pirard 2013).

4.4. Taking stock: on-demand and on-supply approaches display different degrees of bilateral governance

When looking into more details, both examples of transactions for compensation in France, transactions in the on-demand approach and transactions in the on-supply approach seem actually to show different degrees along a continuum of bilateral governance. On the one hand, the on-demand approach clearly corresponds to the classic scheme of ad hoc contracts negotiated between very well-identified parties. On the other, whereas the attempt of securitization in the on-supply approach cannot fully succeed because of the current legal framework and the lack of metrics, it still results in better information and simplification of contractual relations, mirroring some characteristics of market governance. Besides, the development of methodologies in this new framework tends to allow for a limited standardization of certificates, depending on habitats and species concerned. For the developers, when their needs correspond exactly to compensation measures offered by the banks, buying marketed certificates, although these are still quite non-standard, remain a cost-effective and easy alternative.

5. Going ahead: How could biodiversity compensation reach a higher degree of marketization?

In this analysis we contend that compensation in France is actually rather implemented through Coasean agreements regulated under bilateral governance. Although some hard-line criticisms about the way compensation is done in France point at risks of commoditization and marketization of nature, we believe that no real market of fungible units for biodiversity offsetting has emerged yet. And the French Government does not currently intend to launch a trading system of fungible biodiversity offsetting certificates.

Would the French government still decide to move towards a real market, the criteria of equivalence, lying at the cornerstone of the French compensation framework, would make fungibility among offsets very difficult, even if a great variety of certificates could be designed for each type of compensation measure (e.g. one certificate for each kind of species or habitat). Consequently, any market development would require the criterion of equivalence and geographical proximity to be reviewed towards greater harmonization among various frameworks; yet this bears the risk of making compensatory measures inconsistent with regards the residual damages they are supposed to offset, but also the risk to undermine some conservation objectives, in particular for endangered species or habitats.

By analogy, such market for biodiversity offsets would not work as a cap and trade program that sets a cap for the total volume of pollutants to be emitted, and allows for the sale of fully fungible emission permits (e.g. the European trading scheme).

On the contrary, the market could eventually work as a baseline and credit program, where some polluters, without any obligation to reduce pollution, would generate

permits by reducing their pollution below a baseline scenario (business as usual). Such credits may be purchased by other polluters to comply with their legal obligations to offset their pollution or, if not regulated, on a voluntary basis.

Applying such concept to a biodiversity offset program, the latter could resemble a baseline and credit program where offsets are tradable certificates representing the environmental benefits resulting from compensatory measures which have been implemented. Project developers would be able to purchase such certificates and present them to the competent authority in order to comply with their legal obligation to compensate their residual damages. However, to ensure additionality, crediting would only be possible if there is an environmental added value gained through eligible offsetting activities as compared to a baseline scenario (in this case, current policies and regulations in force, e.g. environmental conservation policies).

For such market of biodiversity offsets to be created, many stumbling blocks would have to be removed. First, this market would have to be strictly regulated by the Government in order to ensure that it can effectively contribute to the achievement of conservation goals while guaranteeing no net loss at both national and local levels. It should not only be a way for developers to cost-effectively compensate their residual damages without considering the necessary coherence among the distribution of species or habitats throughout the entire State territory (Quétier et al. 2013).

Second, a key issue relates to the transfer of liability from the developer required to compensate to the operator concretely engaging in biodiversity offsetting activities. Such transfer should be allowed by virtue of the law under clear and strict conditions

and would require that sanctions be enforced in case of non-compliance with permitting requirements. Such transfer of liability should be allowed only if the project developer can ensure the permanence and sustainability of compensatory measures during the whole period when compensation is legally required. For instance the developer should have adequate insurance policies in order to cover the costs of new compensation activities (e.g. buying new equivalent certificates) in case the initial offsetting activities fail after some time.

Third, in order to ensure a predictable demand for compensation, the practices of the regional permitting authorities would have to be harmonised in compliance with the legal texts. To achieve this, scientific knowledge should be improved so as to develop comparable metrics, which could be used across different projects. Strong indicators should be specified to identify how many certificates the project developer would have to purchase (depending of the value of the damaged environment or on the nature of the impacts) and alternatively, to assess how many certificates are to be allocated to each habitat bank. Hence, regulatory entities would have to be established in order to deliver certificates on a harmonized basis.

In conclusion, a shift toward a market of biodiversity units would be limited by the national engagement to protect the environment and the biodiversity, and would require a fundamental change in the treatment of compensation in France, which is not foreseen up to now. Even without promoting the emergence of market governance through tradable permits, there is in any case still a considerable room for improvement in the ecological performance of the French compensation mechanism.

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